EDI MOVES FROM THE VAN TO THE INTERNET

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Executive Summary:

This paper will give a basic background of the Electronic Data Interchange (EDI) system. Afterwards, it will give examples of EDI systems and what are some of the benefits in using them. After giving a list of examples and their uses, it will discuss how it can be implemented and standardized by organizations that need to transmit information electronically. Then, the paper will discuss the issues based around standardizing the format information sent over the EDI system so that comprehension would be achieved by both the sender and receiver. The body of the paper will discuss the security issues that arise when using an EDI system and what the experts have to say about its own security controls. Finally, the paper concludes with comments about the future of EDI and upcoming security concerns.

Abstract

Electronic Data Interchange (EDI) vendors plan to adjust their business strategies because the Internet provides many of the same features as their value-added network (VAN) services. Surgin Internet growth is expected to force companies to stop using VANs for EDI. The companies that continue to offer the service must provide Internet connectivity. Vendors claim the Internet lacks reliability and security whereas VANs have successfully addressed those challenges. Those who support moving VAN services to the Internet counter that authentication and encryption have added stability to the network. When EDI is extended past the VAN onto the Internet, smaller companies are expected to be able to purchase the network services at discounted prices. In this paper, I will discuss the transition EDI has made from using the direct connection with trading parterners to the use of the Internet. Along the way, I will discuss some the security issue that are factors in deciding which transmission medium to use.

Introduction

Upon browsing through today's professional automation journals one can expect to encounter several articles about Electronic Data Interchange(EDI). EDI is rapidly becoming a popular subject amongst serious businessmen who realize that our world could look very different if business was done electronically. Some even go as far as to claim that a company that does not start EDI soon, will not make it into the 21st century. Whether or not this may be true, the fact remains that EDI will be of major importance in the business world of the future.

Electronic Data Interchange is a method by which information is transmitted electronically from sender to receiver. Data that would traditionally be conveyed on paper documents are transmitted or communicated electronically according to established rules and formats. Before transmission of data, these rules and formats are agreed upon between the originator and the receiver so that comprehension of the data is accomplished. International and domestic standards are continuously updated to assist in the construction of rules, formats and flow of data. The data that are associated with each type of functional document, such as a purchase order or invoice, are transmitted together as an electronic message. The formatted data may be transmitted from originator to recipient via telecommunications or physically transported on electronic storage media.

EDI typically implies a sequence of messages between two parties (trading partners), for example, buyer and seller, either of whom may serve as originator or recipient. Messages from buyer to seller could include, for example, the data necessary for request for quotation (RFQ), purchase order, receiving advice, and payment advice. Similarly, messages from seller to buyer could include the data for response to RFQ, purchase order acknowledgment, shipping notice, and invoice.

Examples of EDI Applications

Primary applications on EDI are business documents exchanged by trading partners with extensions to government concerns (taxes). Business information encompasses the entire range of information associated with commercial, financial, and industrial transactions. Examples of applications:

- *Vendor search and selection:* price/sales catalogs, bids, proposals, requests for quotations, notices of contract solicitation, debarment data, trading partner profiles.
- *Contract award:* notices of award, purchase orders, purchase order acknowledgments, purchase order changes.
- *Product data:* specifications, manufacturing instructions, reports of test results, safety data.
- *Shipping, Forwarding, and Receiving:* shipping manifests, bills of lading, shipping status reports, receiving reports.
- *Customs:* tariff filings, customs declarations.
- *Payment information:* invoices, remittance advices, payment status inquiries, payment acknowledgments.
- *Inventory control:* stock level reports, resupply requests, warehouse activity reports.
- *Maintenance:* service schedules and activity, warranty data.
- *Tax-related data:* tax information and filings.
- *Insurance-related data:* claims submitted, claims approved.

Benefits of EDI

There are different categories of benefits from any business program. There are the obvious and *tangible* ones that can be achieved by improving the commercial processes. Some of the tangible benefits of using EDI are :

- Reduction in the transaction cycle time. It is faster to communicate electronically than by traditional papermeans, especially for trading partners who are large distances apart.
- Improved accuracy through the removal of rekeying. If the transaction is received and processed electronically then fewer errors should occur.
- Lower cost per business transaction. The cost of creating, handling and processing paper documents can be reduced substantially by electronic communications once the initial development costs have been paid off.

An example of this type of benefit can be seen in the Retail industry, where EDI has been used to ensure that perishable produce on its shelves is as fresh as possible by continuously reducing the supply chain cycle times.

In addition to these obvious benefits, there are the more indirect and sometimes intangible ones. For example:

- Reduced inventory and obsolescence, brought about by the ability to order later, with more accuracy and less forward forecasting, because the order cycle time has been reduced.
- Improved responsiveness of the business because of the increased efficiency of business transactions.
- Higher productivity of staff who do not need to correct errors caused by traditional rekeying of information.
- Enhanced integrity of business information by building auditable electronic business networks.
- Eradication of some of the issues associated with networking between time zones and geographical areas.
- Closer working relationships with trading partners, more trust and hence earlier joint consideration of opportunities and problems, and easier to do business with.
- Exploitation of new business opportunities and markets.

Usually, these benefits are quantifiable even though it may be difficult. For example, the New York Mercantile Exchange's (NYREX) 24-hour electronic data interchange system for energy futures allows business to continue even when the normal trading markets "sleep" and helps overcome the problems of geography and time zones. Basically, in order to prove that benefits have accrued, measuring the process before and after the use of EDI can demonstrate improvements that will develop a tighter a control on business processes.

EDI Standards

The American National Standards Institute or ANSI is the coordinator and clearinghouse for national standards in the United States. ANSI does not write national standards, it charters organizations called 'Accredited Standards Committees' or ASCs, composed of voluntary representatives from industry, labor, consumer, and government to prepare consensus standards. Upon public comment and approval, ANSI ASCs publish national standards.(Ref 13)

The ASC X12 (a designation assigned by ANSI) was chartered to develop the structure, format, and content of electronic business transactions conducted through Electronic Data Interchange (EDI). The ASC X12 is administered by the Data Interchange Standards Associations, Inc. (DISA), a not-for-profit corporation. DISA staff manages the ASC X12 membership, balloting, standards development and maintenance, publications, communications with ANSI on behalf of ASC X12, and other duties. The result of the ASC X12 committee's efforts are the ANSI X12 standards.

An EDI transaction involves the electronic transmission of a business document in the form of a Transaction Set, that is prepared in accordance with an ANSI X12 standard format, known as a Transaction Set Standard. The ANSI X12 Transaction Set Standards "facilitate electronic interchange relating to order placement and processing, shipping and receiving information, invoicing, payment, and cash application data." A Transaction Set is the data that is exchanged to convey meaning between Trading Partners engaged in EC/EDI. There are currently 187 Transaction Set Standards published by ANSI X12. (Ref 13)

The Federal Government has endorsed the use of ANSI X12 Standards for EC/EDI with the U.S. Government through Federal Information Processing Standards Publication 161. The DoD has published a set of Implementation Guidelines for an approved subset of the ANSI X12 Transaction Set Standards. Those standards included in the DoD are:

1. ANSI 824 - Application Advice
2. ANSI 832 - Price/Sales Catalog
3. ANSI 836 - Contract Award Summary
4. ANSI 838 - Trading Partner Profile
5. ANSI 840 - Request for Quotation (RFQ)
6. ANSI 843 - Request to an RFQ
7. ANSI 850 - Purchase Order (PO)
8. ANSI 855 - PO Acknowledgement
9. ANSI 860 - PO Change
10. ANSI 865 - PO Change Acknowledgement
11. ANSI 864 - Text Message
12. ANSI 869 - Order Status Inquiry
13. ANSI 870 - Order Status Report
14. ANSI 997 - Functional Acknowledgement (Ref 13)

The ANSI X12 standards were selected because they are already used by private industry. They were developed in compliance with ANSI rules for standards development. They build on the success of private industry in implementing EDI. This means that the program represents a mature technology with immediate savings in time, labor, and resources for both the Federal Government and industry. Using the ANSI X12 standards, trading partners will only be required to support a single hardware & software architecture. This simplifies the training burden for the staff who supervise, operate, and support EC/EDI in their organizations. The EDI end-user staff learn one system rather than many. (Ref 13)

Also, the International standards for EDI is called *EDIFACT* (Electronic Data Interchange For Administration, Commerce and Transport). EDIFACT represents the common language for conducting business electronically. International standards for telecommunications were established to give us the means to develop open, electronic, business networks for communication with trading partners around the world.

Value Added Networks

In the past, organizations doing EDI typically have relied on specialized firms called Value Added Networks (VANs) for technical assistance. VANs "add value" to EDI transactions by providing technical support, help desk and troubleshooting for EDI and telecommunications problems. They assist in configuration of software, upgrades to telecommunications connectivity, data and computer security , auditing and tracing of transactions, recovery of lost data, service reliability and availability. Some EDI specific services can include broadcasting an RFQ to a collection of vendors, or storage of EDI information for later search and retrieval.(Ref 14)

Many times, VANs will offer EDI translation capabilities that convert flat text files into EDI X12 or EDIFACT format. This translation software may be designed with a particular technical solution in mind. It is important to consider how the software would be used and what applications and telecommunications software would need to interact with it. It could inadvertently lock the organization into using only one supplier.(Ref 14)

EDI Standardization Process

Standardization of message formats, and of data segments and elements within the messages, makes possible the assembling, disassembling, and processing of the messages by computer. Along with these standards, the sole driving force for this rapid development in standardizing business communications has been the need to improve business efficiency and effectiveness.

EDI standards cover the exchange of data relating to security, administration, trading partner information, contracts, and distribution and sales activities. EDI takes a traditional application file, such as an order file, and maps the data into a standard format. The EDI standard is defined by organizations such as ANSI ASC X12. Most North American companies use X12 standards, however, the international EDIFACT standards are also used. The process of mapping the order data into a standard file is done using translation software. Once the standard file is created, it is sent to the trading partner via a direct connection or a VAN provider. The receiver uses translation software to unmap the standard order file into a format recognizable by its application programs.(Ref 3)

The most predominant issue with EDI standardization is concerned with standards abuse. EDI standards provide a laundry list of data possibilities to select from for a given transaction set, dictating data requirements and exchange sequence. Rather than use the specific place defined for the exchange of shipping instructions, some users employ another area of the EDI document intended for exchanging other notes and comments. This makes the process of mapping more time consuming, since different trading partners can send the same data in various parts of an EDI transaction set.(Ref 3)

Opportunities On The Internet

Today, thousands of companies are using the Internet. These numbers are expected to increase to hundreds of thousands, possibly one million, by the turn of the century. Companies are using the Internet to pursue business opportunities in three areas: electronic collaboration, information distribution and access, and electronic commerce.(Ref 4)

Use of the Internet for electronic collaboration and information distribution and access has focused interactions among end users and between end users and information sources. The many Internet news groups, file transfer protocol (FTP) archives, and World Wide Web sites are testimony to the continuing and expanding focus on this

type of Internet use. Some business examples of this type of Internet activity include mail communications with customers and business partners, the use of telnet for direct sales, the use of FTP for maintaining public archives and for delivering software patches, and numerous internal and external projects utilizing the World Wide Web.

Electronic Commerce (EC), and, particularly, electronic data exchange use of the Internet has focused on providing company-to-company standards-based, secure business transactions electronically. Collaborative efforts such as CommerceNet and individual business pilots between companies are currently under way to test and broaden the use of the Internet. A key component in these efforts is addressing the issues associated with the application-to-application and end-user-to-application interfaces prevalent in EC/EDI.

The Internet provides a variety of capabilities available for EC/EDI use including mail, file transfer, World Wide Web, and remote log-ins. One of the major issues faced in using the Internet for EC/EDI is how to deal consistently with this variety. While transmission control protocol/Internet protocol (TCP/IP) provides the underlying transport protocol for the Internet, the applications must support different protocols dependent on usage. For example, a business application may need to utilize the simple mail transport protocol (SMTP) for mail, FTP for file transfer, hypertext transfer protocol (HTTP) for World Wide Web access, and telnet for remote log-ins. Each of these application protocols presents different limitations with respect to use and value-added functions such as security, encryption, and non-repudiation.(Ref 4)

Taking mail as an example, SMTP, as defined by the Internet Engineering Task Force (IETF) standard request for comment (RFC) 822, performs the message transmission function, but only supports seven-bit American standard code for information interchange (ASCII) transmissions, limits the number of recipients, and often limits the maximum message size. Modifications to SMTP were needed to address the needs of EC/EDI. These modifications came in the form of the multipurpose Internet mail extensions (MIME). MIME defined mail body part structure and content types that provided an SMTP-compatible way to encapsulate documents in mail messages while supporting multipart content types including text, audio, image, video, and even application data. MIME also provided support for several content-transfer encodings including base 64, which enabled incorporation of eight-bit binary data as seven-bit ASCII data.

Further refinements were introduced in RFC 1767 to specifically address the encapsulation of EDI objects within MIME. This permitted the transmission of EDI transactions of EDI transactions through Internet mail supporting both EDIFACT and American National Standards Institute (ANSI) X12 EDI standards as MIME content types and ensured that EDI objects retained their syntax and semantics during transmission. RFC 1767 also established an EDI-consent MIME content type as a catch-all to enable trading partner--specific EDI content types to be defined.(Ref 4)

Internet Security Measures For EDI

With MIME and encapsulation of EDI objects within MIME now in place, the focus has shifted to how best to secure EC/EDI transactions over the Internet. RFC 1767 did not provide any security-related mechanisms, but did acknowledge the need to address authentication, data integrity, privacy/confidentiality/access control, and non-repudiation. It recommended the use of either Internet mail-based security or EDI-based security.(Ref 4)

For Internet mail-based security, two primary approaches have emerged: privacy enhanced mail (PEM) and pretty good privacy (PGP). PEM capabilities are described in RFCs 1421 to 1424, and provide for the confidentiality of messages via encryption, originator authentication, content integrity via message integrity check (MIC) algorithms, and non-repudiation if a public key mechanism is used, PGP, a privately developed public/private key system, provides mechanisms for encryption and authentication.

For EDI-based security, many companies deploy firewalls that selectively restrict mail access to and from the Internet. These security firewalls are capable of monitoring and controlling incoming electronic mail information, hiding the internal network structure from outside access, and encrypting/decrypting and signing/validating messages from outside the firewall. A more recent development, currently being piloted, is the incorporation of security features directly as part of the EDI software.(Ref 4)

Today, companies using Internet mail (SMTP and MIME) to transmit EDI transactions have essentially replaced the EDI transmission components previously provided by value-added network (VAN) suppliers with Internet modules. The basic transaction flow is from the business application or database through the EDI translator to MIME for encapsulation and STMP for packaging, submission, relay, and delivery. At the other end, there is SMTP and MIME stripping, and then passage through the EDI translator into the receiving business

application or database. Where security is a concern, modules are added either as part of the EDI or Internet flow to address encryption, authentication, and non-repudiation issues at both ends.(Ref 4)

EDI On The World Wide Web

Many of the same issues arise when using the World Wide Web for electronic commerce and EDI. The initial use of Web implementations was to provide company information, including information on products and services, on the Internet for access and viewing by end users. The protocol interface for making this information available is HTTP.(Ref 4)

Most companies that have established "home pages" on the Internet for displaying information using HTTP still rely on telephone, fax, or electronic mail to handle order placement functions. Some companies, however, are experimenting with the use of forms that can be filled out on line and submitted for processing by business applications. In these instances, a common gateway interface is established to provide support for forms processing and to interface the World Wide Web to the business applications.

To make business transactions easier on the World Wide Web, hypertext markup language (HTML) allows the creation of forms and provides a vehicle for passing form information to business applications. In addition to text input, HTML forms also support the use of more sophisticated capabilities as pop-up menus, scrolling lists, check boxes, and submit buttons.

As with mail, security is a real concern for electronic commerce and EDI on the World Wide Web. There are two primary areas of concern: Encryption of business transactions to protect contents such as order information and shipping and billing information from alteration or replacement; Protection of any payment information such as credit card or electronic funds transfer information.

Similar to PEM and PGP for mail, there are two emerging security standards and implementations for the World Wide Web. These are secure hypertext transfer protocol (SHTTP) and secure sockets layer (SSL). SHTTP is an enhancement to HTTP developed by the Web Transaction Security Working Group of the IETF SSL was developed by Netscape, Inc., a provider of one of the more popular World Wide Web browsers. Work is currently under way to move these separate security implementations to a common World Wide Web security and encryption capability.(Ref 4)

Whether you intend to use mail, the World Wide Web, file transfer, or any other capability for electronic commerce or EDI business transactions on the Internet, you should strongly consider implementing a secure gateway to control access to and from the Internet. A security firewall or similar capability is essential to protect your business applications and resources from unwanted access or tampering. You may also want to consider establishing separate "logical domains" to further isolate your applications from Internet-access capabilities such as MIME and HTTP. Until security and encryption capabilities are standardized, it makes sense to separate the current implementations from your applications so, as changes occur, they do not directly impact those applications.(Ref 4)

Examples Of EDI Security

Premenos Corporation, a provider of EDI software for electronic commerce applications, has announced its efforts to co-develop a user agent with VeriSign Company, whose charter is to provide digital-signature certification for document authentication.

Premenos recently announced Templar, an EDI-authentication agent to enable confidentiality, authentication, data integrity, and non-repudiation of both origin and receipt. Certification provided by VeriSign will provide TCP/IP business users the kind of scalability to make possible wide deployment of Templar and EDI over the Internet.

Templar software is a layer between the mail agent, such as SMTP/MIME, Lotus Notes, Microsoft Exchange, or X.400. It is the EDI translation software to ensure confidentiality, integrity, authentication, and non-repudiation of both origin and receipt. Templar software also provides operations management, including trading partner set-up, designation of communication and security requirements, key management, and transaction tracking.(Ref 5)

Templar services include 24/7 customer support, education, and training, and specialized services that include trading-partner implementation, system design and configuration, business process automation, and customized projects involving Templar. Premenos will work with Templar customers to provide firewalls, Internet access,

private TCP/IP network configuration, and value-added network (VAN) gateway services, depending on their electronic commerce strategy needs.(Ref 5)

Templar incorporates RSA's public-key cryptography technology integrated at the application layer--the layer closest to the data. The Templar software agent is completely independent of the mail protocol and the underlying network. Premenos' products are based on industry standards including ANSI, UN/EDIFACT, DES, and SMTP/MIME. Based on a client/server architecture, Templar is written in Object-oriented C++.(Ref 5)

The USPS has also been pilot testing the Templar product from Premenos Cop., Concord, Calif., for secure electronic data interchange over the Internet. Templar incorporates public/private key encryption technology. "The intention is to provide an open EDI opportunity, to conduct EDI without the elaborate trading partner structures and private networks," said Rothwell. As the certification authority, the USPS would register a business's public key.(Ref 1)

The VAN And The Internet

The use of EDI over the Internet is in the early stages, although the technology and services are developing rapidly. In the past, organizations doing EDI relied on VANs for technical assistance. Many of these organizations will look to their VAN for assistance in using the Internet.

VAN services have typically used proprietary network or a networked gateway with a specific set of other proprietary networks. In contrast, an Internet Service Provider (ISP) offers generic network access (i.e. not specific to EDI) for all computers connected to the Internet. A direct internet connection permits real time computer-to-computer communication for client-server applications. Alternatively, a part-time internet connection can be used to access internet servers using an on-demand basis, or access another system via email which includes a store and forward method. Internet email may be used as a gateway to proprietary networks if it has an email gateway.(Ref 14)

Internet email can be configured for a dedicated connection with real-time transfers, or a store and forward method (like traditional VANs), or a combination of the two. For example, this occurs where a direct delivery to a trading partner's system is used when a link is operational, and a store and forward from an ISP is used as a backup.(Ref 14)

A large organization can connect their network to the Internet at an internet exchange point, however, most use a commercial ISP, either a major backbone provider, or local resellers of service off one or more backbones. The ISP provides technical assistance and access to local telecommunications links.

The Internet E-mail standards have hierarchical address spaces that are defined and updated in what the Internet calls "domain name servers." Unfortunately, X12 has a flat address space. So, when an interchange is sent (not via the Internet) to a partner who is on a different VAN, your VAN must do a table look-up to figure out what VAN the receiving party is on. If you use only X12 without the Internet, before you can send a message to this partner, you must first contact the recipient's VAN and have them add you as an entry to his VAN's table. If the ISA contained the VAN ID of the recipient, then you could (in theory) send interchanges to partners via the VAN interconnects without having to notify the recipient's VAN first. However, this theory needs to be worked out in practice. In contrast, thanks to the domain name service, Internet e-mail users (and Postal users) don't have to call up their service provider before sending a message across an "interconnect" to another service provider.(Ref 14)

All VANs connected to the Internet are connected to one another, thus avoiding most of the problems of interconnecting proprietary networks. VANs can then focus on services to their customers such as automatic bid submission, market and business opportunity analysis, and translation software.

EDI Via The Internet Without A Van

In order to use the Internet directly for exchanging EDI messages without going through a VAN, you and your trading partner must agree on one of the Internet protocols for exchanging messages and then agree upon some details with the exchange.(Ref 14)

a) Email based messaging

The simplest and most widely supported means of exchanging messages is via internet email. Typically, the IETF-MIME encapsulation specification would be used to enclose the EDI data within the email message, and the trading partners would need to agree upon an encryption method for secure email, typically PEM or PGP.

The trading partners would then exchange:

1. The internet email address for EDI messages.
2. An internet email address for personal communications related to EDI.
3. Agreement on the encryption and digital signature protocols, including email acknowledgment.
4. Public Keys for PEM or PGP encryption and digital signatures (or private keys for DES encryption).
5. Agreement on the format of the message, e.g. IETF MIME/EDI.

b) FTP based messaging

To exchange EDI messages via FTP, some setup information must be included in the trading partner agreement. Typically, an account would be created for each trading partner for a FTP login, including a password. Usually, each X12 or EDIFACT message would be stored in a file, and the trading partner agreement would define the conventions for naming files and directories for the messages.

The trading partner agreement would include:

1. FTP login name and password.
2. Machine(s) from which the login will be accepted.
3. Additional security protocols, e.g. Kerberos.
4. Directory and file naming conventions
5. File encryption protocols and keys
6. Wrappers around EDI data, e.g. MIME/EDI headers, PEM/PGP wrappers, etc.

There are several compression routines and utilities available for virtually any computer system that uses the Internet. Many of these utilities will convert across platforms (e.g., UNIX to Mac, UNIX to PC, and vise versa) and are available for free from one of several FTP archive servers. Use of these compression routines should be used with care when one is employing an encryption technique such as PEM or PGP.

Example of Connecting Existing EDI Systems To The Internet

Sterling Software Inc. will start shipping a number of products designed to tie existing electronic commerce systems into the Internet. Sterling's Electronic Commerce Gateway, which became available in January, is a suite of software and services that extends the reach of Electronic Data Interchange (EDI) value-added networks to companies via the Internet.(Ref 11)

The Sterling offering includes Dataguard, a client/server encryption product based on the X12 EDI standard. Once files are encrypted, they can be sent to the appropriate user on any EDI VAN or the Internet. To manage encryption keys between users, Dataguard will use Veil, a government created system for which Sterling will become the exclusive commercial licenser.(Ref 11)

Electronic Commerce Gateway also includes a messaging gateway to the Internet off of the Gentran Server. It maps data from application files into EDI format.(Ref 11)

Leveraging its existing EDI VAN, Sterling announced it will provide Internet, X.25, and Systems Network Architecture gateways to Commerce Network, which will enable connectivity to other VANs, such as AT&T EasyLink and GE Information Services EDI Express. As an option, the suite comes with Connect Firewall, Sterling's Internet firewall software for enterprise networks.(Ref 11)

Example Of Moving From VAN To Internet Only

AVEX Electronics Inc., seeking to reduce connection costs, decided to move much of its EDI from a private VAN to the Internet. AVEX generates such typical EDI transactions as purchase orders and invoices; EDI eliminates much faxing, copying, data entry and data processing and lets the company perform more transactions with fewer administrative staff. The current AVEX EDI system runs on an IBM AS/400 with software from Data3 Inc. and allows interaction with more than 50 suppliers and customers. AVEX was able to move to the Internet with the development of Premenos Corp's Templar agent for secure transactions. Convincing trading partners that the system is secure and stable is AVEX's biggest challenge. Tracking EDI packets across Internet segments can be difficult. AVEX has only convinced three suppliers so far to exchange EDI over the Internet.(Ref 8)

The Future Of EDI With Expert Opinions

Electronic Data Interchange vendors and their VANs have thrived for the past 20 years. But with the Internet threatening to overtake their services, many of these vendors have begun reworking their strategies. Analysts predict that in the next five years only a few large companies will continue using VANs for EDI; and those VANs will need to provide Internet connectivity in order to survive.

"Companies will eventually move onto the Internet (for EDI)," says Tim Sloane, an analyst at Aberdeen Group Inc., in Boston. "The issue is not if, but when."(Ref 2) Two of the largest EDI vendors, GE Information Services Inc. and Harbinger Corp., have already announced Internet support. "They feel the threat of the Internet," says Tom Pincince, an analyst with Forrester Research Inc., in Cambridge, Mass.(Ref 2)

Some EDI vendors counter that the Internet currently lacks security and reliability. Analysts, however, say these arguments are becoming hollow. "If I were a VAN, I would try to convince you that there were security and reliability issues with the Internet -- but there aren't," says Pincince.(Ref 2)

Most of the major VAN carriers are either working on or have released similar services already, said Amie Shapiro, an analyst at International Data Corp. "Everyone wants to use the Internet for EDI, and many VANs are addressing their security concerns, " Shapiro said. "I think companies will be hesitant to conduct EDI over the Internet, but once it's tested, tried and true, companies will start using the Internet, " she said. (Ref 10)

Specifically, technologies such as encryption, authentication, and return receipts are making the Internet a more stable backbone. EDI vendors traditionally have used proprietary software running over VANs to provide turnkey solutions for communities of interest, such as large manufacturers and their suppliers and customers.(Ref 2)

Internet vendors, meanwhile, are promoting standards-based electronic commerce solutions that would enable secure transactions on a casual basis between suppliers and customers. Most Internet commerce product solutions are geared toward individual consumers. But some companies are looking to the Internet as a future platform for EDI transactions as well. Extending EDI beyond the VAN to the Internet would open the market to serve medium-size and small businesses. And greater competition among EDI vendors using Internet connections will probably bring EDI prices down low enough to accomplish that goal.(Ref 2)

EDI may be the application that will introduce the Internet into mainstream IS. EDI, which has existed for two decades, may supply a new information transport path that is markedly less costly than the proprietary networks in use today. However, the transition to EDI on the Internet will require hard work and changes. One expert suggests that adding Internet technology to EDI is a great idea, but the realities are very challenging and complex.(Ref 6) The Internet is much less costly than proprietary networks, but the change will require IS personnel to be EDI administrators. Users, for their part, would have to create or buy their own security products and develop redundant backup systems that would come up whenever Internet transmissions have problems.

Future Transitions To The Internet

User efforts to adopt EDI services should get a boost from products provided by a trio of vendors that move EDI off value-added networks and onto the Internet.

Sterling Software Inc., Harbinger Corp. and Premenos Corp. --significant players in the EDI market--said they are embracing the Internet to provide their large corporate customers with access to a greater number of suppliers and contacts.

EDI generates the bulk of electronic commerce today--$130 billion of goods were transacted worldwide through EDI versus $70 million in transactions over the Internet during 1995, according to an October report from Input, a Mountain View, Calif., research company.

Sterling last week announced exclusive licensing of Veil, an encryption and key management software, which is a stand-alone product and as a component of its EC Gateway software and services.

The EC Gateway includes the Gentran:Server, an EDI translator and messaging management product; Connect:Firewall; and Veil and Gentran:Dataguard, encryption for creating a secure tunnel over the Internet to send data. Sterling provides the clearinghouse, or VAN, which clears the EDI transactions.

To automate bill payment, Sterling announced an alliance with Visa International, which creates an end-to-end electronic network between customers and their banks, as well as billing corporations and their banks.

"If the Internet becomes the way to get to more suppliers, especially smaller suppliers, and as we build our global network, it may be easier, more efficient and less expensive to reach out to those in other countries that don't have sophisticated communications techniques like we have, " said Roger Trout, EDI manager for Mobil Oil Corp., Fairfax, Va., a user of Sterling's EDI software.

Harbinger, Atlanta, also an EDI VAN service that provides EDI services for Sprint customers, announced its Internet strategy for shipping products in the second quarter of 1996. The company will ship a browser, firewall, gateway and security software called TrustedLink, which supports SMTP and S/MIME. Harbinger's software will let users connect directly over the Internet to other users of the same Trusted-Link software, as well as allow connections over its Internet Value-Added Service.(Ref 7)

Premenos, Concord, Clif., introduced Premenos WebEDI, World Wide Web-based software available in the first half of 1996. WebEDI is targeted at anyone with an Internet connection and a Web browser who wants to perform EDI transactions to encourage more robust worldwide EDI deployment.(Ref 7)

Discussion

There is a tendency for each organization to establish its own rules and administrative policies, leading to rising costs of dealing with multiple trading partners, each inturn with its own requirements and procedures. However, new technologies and business practices are necessary if EDI is to move beyond the 30 to 40,000 organizations presently using EDI. According to Department of Labor and Internal Revenue Service statistics, there are about 6.2 million entities with employees and about 14 million other "business" entities.(Ref 14) A business that wants to sell chairs, for example, would have to check with many different customers to see if they had any requirements. By making it possible for a business to use a common method to look for customers, the barriers entering to the electronic marketplace are greatly eased. This does not mean that there is only one source that everyone goes to for a list of current business opportunities. Rather, a prospective supplier only needs to go to a single electronic marketplace. To communicate with each other, the various pariticipants in electronic commerce need to harmonize their procedures and processes. Examples include common trading partner registration and the adoption of standard implementation conventions for EDI messages.

Keeping this in mind, the Internet can be used to send transaction sets to existing trading partners via SMTP or FTP messages. VANs were typically used for *bilateral relationships* between companies, whereas the Internet is useful for establishing *multilateral relationships*.(Ref 15) These bilateral relationships are usually quite stable, but both parties had to agree to share the same VAN or get their VANs to interconnect. Multilateral relationships are between organizations that don't necessarily have existing relationships and may be rather ehpemeral. The Internet is suited to dynamic multilateral relationships that may later evolve into static bilateral relationships between companies using VANs. Therefore, the issues concerning the Internet (security, availability, etc.) are manageable in the early stages of forming a relationship. If your current VAN is not capable of using the Internet, you may need an alternative route for those messages. Later, as the business relationship matures, the use of VANs may be appropriate as the level of communication becomes more important. For example, unless your system has a directory of all registered trading partners, you lack the capabilities to screen and validate transactions that arrive at your site.

Conclusion

We have discussed EDI progress from the VAN to the Internet. Throughout the discussion, we learned that, initially, very few changes may be apparent. New and existing VANs will use the Internet to collect and disseminate EDI transactions; trading partners may be totally unaware of the change in technology. Prices may fall as VANs share telecommunications resources through Internet Protocols rather than maintain their own costly proprietary telecommunications services. Instead of competing with VANs, the ubiquitous connectivity of the Internet offers VANs even greater business opportunities. General purpose Internet Service Providers (ISPs) do not typically offer EDI specific services, but they can provide an alternative means to transfer EDI messages at a small fraction of the cost of typical EDI VANs.

The impact of an organization's moving EDI onto the Internet, independent of a VAN, is more difficult to assess. In the view of some, the introduction of the Internet in the near term (1-5 years) adds additional interfaces and complexity to the organization's existing EDI environment. This may in the short term increase costs and raise new costs. But a corporate commitment to an open systems environment through the use of Internet Protocols offers the potential for a greater interoperability, integration of application systems, and therefore the promise of

higher performance and lower costs. Some organizations will be able to get to these benefits others will pay for a set of largely incompatible services. The return on investment largely depends on one's ability to consider EDI on the Internet as a part of the organization's overall information systems strategy and the organization's plans for a presence on the Internet.

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